

AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions and listings of claims in the application:

LISTING OF CLAIMS:

1. (Original) An optical printing head of a side-printing device for printing data of a photosensitive material as a latent image on a side margin of said photosensitive material while said photosensitive material is being conveyed in a direction, said optical printing head comprising:

a plurality of light emitting elements mounted on a substrate and arranged along a perpendicular direction to the conveying direction of said photosensitive material;

B' a partitioning device mounted on said substrate, for partitioning said light emitting elements from each other, to prevent interference between rays from adjacent ones of said light emitting elements;

a diffusion device for diffusing rays from said light emitting elements, to equalize luminance of rays from each light emitting element; and

a converging lens system for projecting rays from said light emitting elements onto said photosensitive material, wherein each of said light emitting elements is assigned to record a dot at a time when driven in synchronism with the conveying movement of said photosensitive material, thereby to print said latent image line by line.

2. (Original) An optical printing head as recited in claim 1, further comprising a mask plate disposed between said diffusion device and said converging lens system, said mask plate having openings in correspondence with said light emitting elements, said openings limiting heading directions of the rays from said light emitting elements and having a shape corresponding to an expected shape of said dot.

3. (Original) An optical printing head as recited in claim 1, wherein said partitioning device comprises a plurality of thin plates placed between said light emitting elements.

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4. (Original) An optical printing head as recited in claim 3, wherein spaces between said thin plates are filled up with a transparent coating material to coat said light emitting elements.

5. (Original) An optical printing head as recited in claim 4, wherein said diffusion device comprises light diffusing particles mixed into said coating material.

6. (Original) An optical printing head as recited in claim 1, wherein said partitioning device comprises a thick plate having openings for exposing said light emitting elements.

7. (Original) An optical printing head as recited in claim 6, wherein said openings of said thick plate are filled up with a transparent coating material to coat said light emitting elements.

8. (Original) An optical printing head as recited in claim 7, wherein said diffusion device comprises light diffusing particles mixed into said transparent coating material.

9. (Original) An optical printing head as recited in claim 1, wherein said diffusion device is a diffusion plate mounted on said partitioning device, to cover up all of said light emitting elements.

B' cnt. 10. (Original) An optical printing head as recited in claim 1, wherein said light emitting elements are arranged in a plurality of rows, each row extending in the perpendicular direction to the conveying direction of said photosensitive material.

11. (Original) An optical printing head as recited in claim 10, wherein said light emitting elements of each row are spaced from each other by a distance that is equal to or slightly less than a length of each light emitting element in the perpendicular direction to the conveying direction of said photosensitive material, and said light emitting elements of one row are staggered from those of adjacent rows in said perpendicular direction by an amount approximately equal to said distance.

12. (Original) An optical printing head as recited in claim 11, wherein adjacent two rows of said light emitting elements are paired to emit rays of a different color from other pairs of rows of said light emitting elements, thereby to print said latent image in different colors.

13. (Original) An optical printing head as recited in claim 10, wherein said light emitting elements are aligned in both widthwise and lengthwise directions of said photosensitive material, and emit rays of different colors from one row to another to print said latent image in said different colors.

14. (Original) An optical printing head of a side-printing device for printing data of a photosensitive material as a latent image on a side margin of said photosensitive material while said photosensitive material is being conveyed in a direction, said optical printing head comprising:

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three light emitting element array units for emitting rays of three colors, each of said light emitting element array units comprising an array of light emitting elements mounted on a substrate and arranged along a perpendicular direction to the conveying direction of said photosensitive material, said light emitting elements emitting rays of one of said three colors, a partitioning device mounted on said substrate, for partitioning said light emitting elements from each other, and a diffusion device for diffusing rays from said light emitting elements;

dichroic mirrors for mixing the rays of three colors from said three light emitting element array units, and directing them toward an exit of said optical printing head; and

a converging lens system provided at the exit of said optical printing head, for projecting three color rays from said light emitting element array units onto said photosensitive material, wherein each of said light emitting elements of said three LED array units is assigned to record a

dot at a time when driven in synchronism with the conveying movement of said photosensitive material, thereby to print said latent image line by line in said three colors.

15. (Original) An optical printing head as recited in claim 14, wherein each of said light emitting element array units further comprises a mask plate disposed on an opposite side of said diffusion device from said light emitting elements, said mask plate having openings in correspondence with said light emitting elements, said openings limiting heading directions of the rays from said light emitting elements and having a shape corresponding to an expected shape of said dot.

B' Cont. 16. (Original) A side-printing device for printing data of a photosensitive material as a latent image on a side margin of said photosensitive material while said photosensitive material is being conveyed in a direction, said side-printing device comprising three optical printing heads for emitting rays of three colors respectively, each of said optical printing heads comprising:

a plurality of light emitting elements mounted on a substrate and arranged along a perpendicular direction to the conveying direction of said photosensitive material, said light emitting elements emitting rays of one of said three colors;

a partitioning device mounted on said substrate, for partitioning said light emitting elements from each other;

a diffusion device for diffusing rays from said light emitting elements; and

a converging lens system for projecting rays from said light emitting elements onto said photosensitive material, wherein each of said light emitting elements of said three optical printing heads is assigned to record a dot of one color at a time when driven in synchronism with the conveying movement of said photo sensitive material, thereby to print said latent image line by line in said three colors.

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17. (Original) A side-printing device as recited in claim 16, each of said optical printing heads further comprises a mask plate disposed between said diffusion device and said converging lens system, said mask plate having openings in correspondence with said light emitting elements, said openings limiting heading directions of the rays from said light emitting elements and having a shape corresponding to an expected shape of said dot.

18. (New) An optical printing head as recited in claim 1, wherein said light emitting elements are arranged in-between portions of the partitioning device.

19. (New) An optical printing head as recited in claim 1, wherein:
said partitioning device comprises a plate-like structure with an upper and lower surface extending substantially parallel to the substrate;
the plate-like partitioning device comprises through holes located to radially enclose each of the light emitting elements; and
the upper and lower surfaces extend between the through holes.

20. (New) An optical printing head as recited in claim 1, wherein:

the light emitting elements are positioned in at least four rows arranged orthogonally to the conveying direction of the photosensitive material;

the light emitting elements positioned in a first and third row of the at least four rows are aligned in a direction parallel to the conveying direction of said photosensitive material;

the light emitting elements positioned in a second and fourth row of the at least four rows are aligned in a direction parallel to the conveying direction of said photosensitive material; and

light emitting elements positioned in the first and the second rows are offset from each other, so as to have a minimum overlap in the conveying direction of said photosensitive material.

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21. (New) An optical printing head as recited in claim 20, wherein the offset is approximately equal to the size of the light emitting elements.

22. (New) An optical printing head as recited in claim 20, wherein:

the light emitting elements positioned in the first and second rows emit a first color; and

the light emitting elements positioned in the third and fourth rows emit a second color, which is different from the first color.

23. (New) A side-printing device as recited in claim 16, wherein:

the converging lens systems project the rays from the respective light emitting elements at three different angles respective to the photosensitive material; and

the rays projected from the respective light emitting elements are directed towards a single portion of the photosensitive material.

24. (New) A side-printing device as recited in claim 14, wherein the dichroic mirrors allow red rays to pass therethrough.

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25. (New) A side-printing device as recited in claim 14, wherein at least one of the dichroic mirrors allows green rays to pass therethrough.

26. (New) A side-printing device as recited in claim 1, wherein:
the plurality of light emitting elements have a dark spot at a radially center portion thereof; and
the diffusion device equalizes the luminance difference between the dark spots and the remaining portions of the light emitting elements.

27. (New) A side-printing device as recited in claim 1, wherein the diffusion plate is semi-transparent, and comprises an array of micro lenses of a several micro millimeter size.

28. (New) A side-printing device as recited in claim 1, wherein luminance reduction through the diffusion plate is less than that of a luminance reduction through a diffusion plate of fogged glass.

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29. (New) A side-printing device as recited in claim 1, wherein less than all of the light emitting elements are activated to emit light at a single time, and specific patterns are thereby generated on the photosensitive material.
